Managing Committee.

J. C. WRENCH, B.,A., I.F.S.
(President.)

Rao Sahib V. N. SESHAGIRI RAO, B.A., M.F.S.
(Business Superintendent.)

G. VISWANATHAM, B.A.
(Editor and Treasurer.)

N. VELAYUDHA NAIR, B.A., *(Senior Student.)*

M. D' SOUZA, B.A., *(Junior Student)*
(Assistant Editors.)

CONTENTS.

No.		PAGE.
1.	Gap regeneration in deciduous forests of Mount Stuart—By N. C. Madappa, M.F C. Student 1932–'34 Dn.	120
2,	A review of the Kancha system of grazing in the Madras Presidency-By "I. F. S." ...	123
3.	Abstract of results of germination tests on certain seeds	141
4.	College Notes	143
	The First Coimbatore Olympic Sports ...	143
	Cross Country Race, 1933— ...	144
	M. F. C. Students' Club-Day— ...	145
	Examiners, Jund 1933— ...	145
5.	EXTRACTS :—	146
	Sleepers for L. M. S. (146). Mycorrhiza on Conifer roots (146). Present status of the Sandal-wood Spike–disease in South India (147). Forestry in the State of Victoria in Australia (148). A new source of rubber (151). Laterites and lateritic soils (152). Canadian Forestry (154). Government review on the Forest Administration report of the Madras Presidency (155). Preservation of fossil bones (157). Bast Sap (157). Virus diseases (157). Twisted trees (159). Virus diseases and intracellular inclusions in plants (161). Prize howlers (162).	
6.	Departmental Notifications	163

THE

Madras Forest College Magazine.

(PUBLISHED QUARTERLY.)

Vol. XVII. MARCH 1933. No. 3.

The Managing Committee do not hold themselves responsible for opinions expressed by contributors.

Gap regeneration in deciduous forests of Mount Stuart. (Tunacadavu Range).

BY, N. C. MADAPPA,
(Junior Student.)

The area which is not suitable for clearfelling and concentrated regeneration with teak is constituted as the Selection Working Circle. The total area of the Selection Working Circle is 19.760 acres and the felling cycle for the same is 40 years.

It is said that this type of forest is not fit to have clearfelling and concentrated regeneration with teak. But the principle that should be observed in sound forest management is that trees should not be extracted without taking adequate steps to replace them. So for these areas the gap or patch regeneration has been prescribed by the Working Plans Officer.

The method is, that, when all the exploitable trees are marked and exploited departmentally the District Forest Officer will go over the area and select as many suitable gaps as possible. While selecting the gaps the following points are taken into consideration (1) The size of the gap should not be less than 25 feet by 25 feet. (2) The soil should be suitable for teak (3) Gaps containing natural regeneration of important species viz., *Terminalia tomentosa*, *Terminalia paniculata*, *Dalbergia latifolia*, *Pterocarpus marsupium*, and *Lagerstroemia lanceolata*, should be avoided. The larger the gap the better it is within limits; but excessively large gaps should be avoided as they approximate to small plantations; an average gap is 2 chains x 2 chains or about 4 acres. The size is also increased by cutting bamboos and useless species around the gaps. All the gaps are marked with pegs.

The selection being over before the commencement of north-east monsoon, and during the months of October and November the branchwood of the felled trees is cut and piled in the middle of the gaps. The pile should be low and flat, the height being not more than four feet, so that the burn may not be too hot, as a fierce burn bakes the ground on which teak and other species will not thrive.

In the following January a boundary line is cleared and burnt to a width of 12 feet, so as to enclose all the gaps chosen for regeneration and the piles are burnt, taking care that the fire does not escape into the surrounding forest.

In February the ashes are spread over the ground and staked at 6 feet by 3 feet for stumps by eye. Then the area is planted with teak stumps in the centre, the

periphery is sown with *Dalbergia latifolia* and *Pterocarpus marsupium* seeds between, thus :—

R	R	R	R	R	R	R
R	V	V	V	V	V	R
R	V	T	T	T	V	R
R	V	T	T	T	V	R
R	V	T	T	T	V	R
R	V	V	V	V	V	R
R	R	R	R	R	R	R

Planting of teak in the centre of the gaps is to be emphasised as it is a light demander. An average gap will contain 20 to 30 teak stumps. Teak is planted as soon as the south-west monsoon is established by end of May and the other species are sown in the beginning or middle of June.

Weeding and tending are left to the discretion of the District Forest Officer as per the Working Plans. But a forest Guard is made responsible for this work and we saw that all the patches were well weeded and neatly kept. He is also given the assistance of one or two coolies.

The total estimated cost of the formation and tending of an average gap is about three rupees only per gap for the first year tending.

———

A review of the Kancha system of grazing in the Madras Presidency.

By, "I. F. S."

A brief outline of the past history of the 'kancha system' is furnished below :—

From time immemorial the old Nellore District (including the present Nellore and half of Guntur District) was famous for private cattle breeding, and produced goodsized, good-looking, strong and healthy bulls and cows. The owners took considerable trouble in breeding, feeding and tending the animals. They were valued not only in the district itself but in the adjoining districts also with the result that they were always able to get good prices for them. The bulls and cows of this district were always considered to be the best in Southern India and fetched good prices and the people of Nellore always considered them as an essential part of their wealth and devised a self-disciplined and controlled system of grazing calculated to conserve and utilise the pasture land to the best advantage of their cattle and this forms the essence of the kancha system. An essential point to be noted is that the kancha system was neither introduced nor forced by Government upon an unwilling people (as is often misrepresented by the people and wrongly believed by their supporters both official and nonofficial) but was devised and adopted by the people themselves on account of its intrinsic virtues. This system has been followed only in the Nellore district and the Satiavedu range of the Chingleput district and in no others.

Even prior to the advent of the British Government two systems prevailed side by side in the Nellore district viz.,

(i) The pullari system by which the State levied a lump sum tax for grazing on each village.

(ii) Kancha system—the system of leasing out of grass farms consisting of extensive blocks of pasture land for a definite term of years.

In 1867 Government abolished the pullari system, retaining the Kancha system wherever it existed, and ordered that grazing lands to the extent of thirty per cent of the total cultivated area of the village should be set apart for free grazing—known as shekadas and the excess area sold out to the highest bidder. These orders were subsequentfy modified in 1875 in two respects viz., (i) the area allotted for free grazing was increased to 150% of the cultivated area and (ii) the excess area should be leased out as kanchas at certain fixed rates per acre. At the same time Government also assigned large blocks of grazing lands on patta to private individuals to be retained and used as such. Many of these are still retained as private kanchas. In 1890 the Government, after examining the policy to be adopted in consequence of the introduction of the Forest Act, decided to constitute all available forest and grazing areas into Reserved Forests and accordingly all kancha areas and Shekadas were constituted Reserved Forests. This led to overreservation which naturally caused discontent among the beople. In 1896 the Government ordered the exclusion of reasonable areas required for the communal needs of the villagers from reservation.

Consequent on the reservation of all kancha and Shekada grounds, the permit system was introduced in 1895. The kancha system lingered on (until the completion of the lease periods) and was abolished in 1898 and the compartmental system of grazing—in which one half of the grazing area was alternatively closed and

opened to grazing—was tried during the years 1900 to 1902 and in the end was reported to have been intensely unpopular and to have failed hopelessly. During this short period, the people keenly felt the evils of this permit system and clamoured for the kancha system. In 1902 the kancha system was reintroduced as an experimental measure for the benefit of the cattle breeders on the following lines :—

(i) That small areas of Reserves should be leased out for grazing at a fee of Re. 1 per head of cattle (2) That the cattle to be grazed should be limited to two per acre. (3) That the lessees should not sublet the privilege to others.

But the people did not take the kancha leases as the conditions were not acceptable to them. In 1903 the Board modified the conditions as follows :— (1) That the minimum rent be reduced to four annas per head of cattle. (2) That lease be granted for a term of five years with an option of renewal. (3) That lease be granted to representative villagers subject to the condition that the grazing should be restricted to the local agricultural cattle. (4) That the prohibition against sub-letting should stand. With these modifications the kancha system became popular and was eagerly and extensively accepted.

In 1906 the Government outlined the grazing policy to be adopted in Nellore. They considered that it was the duty of the Forest department to encourage the cattle breeding operations carried on in the district by extending and popularising the kancha system on favourable terms and by introducing the principle of selection of cattle to be admitted into the kanchas and that the minimum limit of four annas per acre and the prohibition against subletting should be relaxed and requested the

Forest Commissioner to investigate the whole grazing question and suggest measures, to be adopted in the future. Accordingly in 1906 the Forest Commissioner after inspection and local enquiry arrived at the following conclusions :—

(i) The Reserved Forests in Nellore should be worked primarily for the provision of grazing of both the local cattle of the western taluks (where the bulk of the grazing areas lie) and the cattle of the eastern delta taluks (which have no local grazing facilities) which have to turn to the western taluks for grazing.

(ii) The Forest Department should encourage and extend the kancha system largely. The local villagers should first be offered the kanchas attached to their villages at a fixed rate per acre—ordinarily four annas—which the Collector should have discretion to increase or reduce according to the conditions prevailing at the time. The areas so offered should be restricted to the absolute requirements of local ryots in order to prevent them from making undue profit by sub-letting to other villagers. The remaining areas should be sold by auction for the use of the villagers of the eastern delta taluks.

(iii) Partly as an object lesson and partly to provide grazing for local ryots who might be unable to pay the kancha fees, certain areas should be kept under the permit system. The existence of the permit system in a few areas would prevent kanchadars from charging exhorbitant rates. So far as the Forest Commissioner was able to ascertain, all the ryots, rich and poor, were, in favour of the kancha system and there was not a single individual who expressed a contrary opinion. The Government accepted the conclusions of the Board.

In 1912, the Forest Committee visited Nellore and interviewed the ryots on grazing questions and parti-

culary the kancha system. Its views on that system are extracted below :—

"In Nellore the ryots as a rule are prepared to pay considerably higher fees for grazing if the grazing is so regulated that there would be grass enough for their valuable animals to have their fill." * * * * * *

"If Agricultural cattle are to be sent to the Forest at all they should be sent to places specially reserved for them, where the number of cattle allowed to graze is strictly limited, where the grazing is so regulated that there is no danger of their coming into contact with diseased cattle and where the grass is reserved for some time after the commencement of the rains so that there is sufficient grazing to keep up their strength. These conditions are realised to some extent by the kancha system in Nellore where a cattle owner is able on payment to reserve a portion of the forest for his own cattle and to see that they are properly guarded and that their number is limited. * * * *

"In Nellore including Ongole where agricultural opinion in the matter of cattle breeding is far more advanced than in the other districts visited by the Committee the first complaint put forward was that the number of cattle admitted into the forest was so large and the rotation of grazing was so badly managed, or rather not managed at all, that the grazing in the open forest was of no value whatever for agricultural cattle... In Nellore it is well recognised that no forest should be grazed above its possibility.

"The Committee are satisfied that these village kanchas have worked well. Their occasional failures appear to have been due to the bad faith of individuals who have taken a kancha in their own name on behalf of

the village and have then abused their opportunity by exacting competitive rates from the village cattle owners"

It was soon found by experience that the areas opened under the permit system were overgrazed and deteriorated in consequence, so much so that the grazing grounds were looked upon by villagers as cattle stands during the cultivation season. The evils of the permit system were fully recognised and became so pronounced that the Forest Commissioner in a conference with the Conservator, Central Circle and local officers decided in 1914 on the abolition of the permit system in favour of the kancha system. The latter system has been in force in the district since 1-7-1914. The same conference recommended the appointment of a Deputy Collector on special duty to prepare a report on the kancha system—its origin and past history, its ideals, and suggestions for its improvement and expansion. A Deputy Collector was accordingly appointed and his exhaustive and valuable report was recorded with the following remarks :

" The Special Officer's report contains much interesting and useful information about the kancha system which appears to be the most promising attempt yet made to solve the grazing problem in Reserves."

It is interesting to note that the system was so popular in 1917-1918 that as many as three hundred and seventy kanchas covering an area of 256,379 acres of grazing lands were working in that year.

The Government is recording the Special Officer's report desired to be furnished with a concise report on the kancha system. In 1919 Mr. D. L. Sathe, District Forest Officer, Nellore at that time, accordingly submitted a report explaining the system, its merits and faults and suggesting measures for its improvement. The chief

Conservator (Mr. Cox) in forwarding the report to Government stated that he was personally acquainted with the system and the forests to which it was applied and that although mistakes had been made in the past—the complete withdrawal of the protective staff—and although there were practical defects in the administration which required remedy, yet the system itself was the most suited to the district and probably the most efficient in the presicency from the point of view of owners of valuable cattle. He accordingly proposed to hold a conference with the local officers to consider what practicable measures could be adopted to reform the system. The Government suggested that either the Director of Agriculture or one of his staff should attend the conference and called for the Chief Conservator's report on the adequacy of the measures adopted for the prevention of the deterioration of the kanchas and for their improvement. Mr. Cox held the conference in January 1920 (which was also attended by the Director of Agriculture) in which the practical working of the kancha system and the difficulties experienced both by the villagers and by the Forest Department were discussed at length and the views representative of all interests--the kanchadars, the ryots, and the owners of valuable cattle—were obtained and the memorandum of the proceedings of the conference was drawn up by the then District Forest Officer Mr. Madan. The main grievances represented before the Conference were:—(1) closure of the kancha area for five months (2) the high rates (Re. 1 to to Rs. 1–8–3) collected by kanchadars (3) the cattle of the delta taluks invading the kanchas in the western taluks.

As regards (1) the Conference held that the closure of the kancha areas was necessary and as regards (2) and (3) it recommended that the "local kanchas" should

not be auctioned but should be offered to the local ryots at fixed rate per acre based on the average of the sales of the previous three years subject to a minimum of four annas per acre and that kanchas remaining unsold should be sold by auction for the benefit of the cattle owners of the delta taluks and that long term leases should be enouraged to induce the kanchadars to take a sustained interest in the management of the area. One interesting fact to be noted is that only three petitions were received for the abolition of the kancha system and reversion to the permit system and their genuineness was doubtful. After discussion the conference came to the conclusion that the ryots were grossly exaggerating their hardships, that as a matter of fact they wanted to revert to the permit system on account of its comparative cheapness, freedom from all restrictions, (which constitute the essence of the kancha system) and the scope for illicit grazing by bribing the lower paid subordinates. The conference further held that the rules should be made more elastic allowing discretion to the District Forest Officer to relax them or modify them to meet the special circumstances of each case. Some of Mr. Cox's remarks in submitting the conference proceedings to Government are extracted below:—

"It would be a mistake to consider that the present kancha system is generally acceptable to the Nellore District. To the better class of cattle owners and some of the more enlightened villagers no doubt it is welcome, but to many others it is not, and the conference listened to long complaints many of which were greatly exaggerated."

"The complaints came mainly from the Western taluks where there is a general demand for unlimited grazing at the old rates under the permit system. They

merely represent a protest against any reform and in course of time they will cease. It is not denied even among those who complained that the value of the cattle has increased greatly during the last few years and that the kancha system does provide more fodder than was possible under the old conditions.

"If local kanchas are formed for villages on the west to meet their needs there should be no legitimate cause for complaint.

"I have no doubt that the system is a better system of forest grazing than any other in the presidency, if only for the reason that the natural jungle grasses are permitted to grow into a crop before being subjected to grazing and that there is some real attempt to distinguish in practice between forest grazing and the destruction of forest by browsing and lopping—a practice so prevalent in Guntur and other districts.

"But the system is only possible on a large scale in a district like Nellore, which is very under-populated and contains large areas of cultivable waste lands whether Reserved Forests poramboke, or 'bidus'.

"The general feeling of the conference was that the grazing reserves should be managed as an object lesson to the ryot of the advantages to be gained by the restriction of the somewhat limited forest grazing resources for the benefit of the better class of cattle. Such advantages would be the general improvement of the land with its attendent higher value in the market."

From 1920 onwards the kancha system worked fairly smoothly and satisfactorily until September 1930 when a certain section of the ryots of the Kanigiri taluk (lying wihthin the south Kurnool Division) complained of hardships caused by the kancha system and wanted its abolition and the introduction of the permit system.

The Collector after enquiry found that the hardships were due mainly to a temporary cause viz., failue of the monsoon and ordered the substition of the permit system for the kancha system temporarily in 1930-31. Subsequently the Collector had a brief encomic survey of the local conditions on certain specified lines made by the local Revenue Divisional Officer—the result of which also pointed to the same conclusion viz., that the hardships were temporary and were due to the failure of the monsoon. The report of the Collector, Mr. A. C. Woodhouse, is reproduced below *in extenso*:—

" The villagers of Kanigiri taluk residing in villages bordering Nandanavanam A and B and Vedulla Cheruvu reserves, now in the South Kurnool division petitioned me and the Board of Revenue about the end of August 1930 and complained of hardships they were undergoing under the kancha system and requested the introduction of the permit system that existed in the rest of South Kurnool Division. Their chief objections to the kancha system are (1) that they were unable to get fuel and wood for household purposes either free or for money as easily as they would if the permit system was in force. (2) that during the closure period of five months a year, they were not able to get grass for their cattle and consequently their cattle were deteriorating and were dying of starvation. (3) that they were subject to heavy penalties for forest offences.

The Conservator accompanied by the District Forest Officer, South Kurnool and local Revenue Inspector toured the villages adjoining the reserve about the end of September 1930 and beginning of October 1930 and inquired into the alleged grievances of the villagers. He came to the conclusion that the people were temporarily in comparative distress, that the kanchas (with one

possible exception) were destitute of grass and that the cows and buffaloes were in urgent need of proper feeding and made an alaborate report to me, recommending temporarily for 1930-31 either introduction of the old permit system or the reduction of the kancha rate to Rs. 0–2–0 an acre. As 1930 was an exceptionally bad year owing to the absence of rain for nearly 6 months ending October 1930, I ordered the introduction of the permit system and suspension of the kancha system temporarily for 1930-31.

Later on the Revenue Divisional Officer, Kandukur conducted, at my instance, a brief economic survey of local conditions on specified lines. I am satisfied that the uufavourable conditions noticed by the Conservator who inspected the locality at a very bad part of the year were due entirely to temporary causes, namely holding off of rains for nearly six months in a tract that usually does not get much rain. The situation was temporarily met by a suspension of the kancha system and the adoption of the permit system.

The enquiry made by the Revenue Divisional Officer, shows that there is no great deterioration of cattle generally in the locality or any appreciable mortality among cattle that may legitimately be attributed to the kancha system. In fact, the conditions were not materially different from what they were when Mr. Cox made a survey in 1919. Instead the kancha system has much to recommended it : It is favourable to the ryot, the cattle, and the forests. If the kancha system as worked in the particular locality has defects, the interested ryots and the cattle owners are responsible. There is no gainsaying the fact that of recent years the quality of stock is deteriorating because of promiscuous breeding and the failure to weed out weak and

unhealthy stock. It is necessary therefore to discourage the indiscriminate breeding of cattle. The Royal Commission on Agriculture particularly stressed the necessity for restrictions on such breeding. The kancha system practically fulfils the recommendations of the Royal Commission, because it limits grazing and thus checks the size of herds. If it failed in the locality the ryots are mainly to blame. Every effort is made to provide for the management of kanchas by interested ryots and not by outsiders who look mainly to profit on grazing, instead of improvement of stock. It was within the power of interested cattle owners and ryots to secure the kancha rights and if outsiders got control of the kanchas, it was because these people were apathetic. To revert them to the permit system would defeat the object of the existence of these classes of forests, namely, the provision of grazing for the encouragement of the breeding of a healthy stock. For the above reasons, I do not see my way to approve of any change in the kancha system in the locality. The kancha system is not always popular because the ryots are not advanced enough to look far ahead, and undoubtedly advantage was taken of temporary unavoidable conditions to secure a permanent reversion to the old order of things. I have already informed the Conservator Second Circle that the Kancha system ought to continue for the reserves of Kanigiri taluk and that the notifications about grazing for 1931-32 should be issued accordingly".

The Chief Conservator of Forests (Mr. Richmond) agreed with the Collector in the view that the kancha system should be continued in the Kanigiri range. In 1931–32 and 1932–33 the people, encouraged by the success in their first attempt, refused to take up the kancha leases with the result that the permit system had

to be continued. But the ryots have been warned that permit system was continued only temporarily and will not be made permanent.

In October 1930 the residents of Kambakkam of Satiavedu range in the Chingleput district petitioned the Collector and the Board of Revenue representing that the kancha system caused hardship to them by closure of the areas to grazing for five months, by the limitation of cattle to be grazed and by the prevention of cattle from being grazed in the adjoining hill slopes and prayed for the transfer of the forests to Class III and for the replacement of the kancha system by the panchayat system. As the forest contains valuable growth and as the ryots' grievances were not real but were only put forward to get rid of the kancha system the petitioner's requests were refused. This was in July 1931 and since then there have been no further complaints.

The kancha system as it is worked at present is briefly described below :—

The kancha system prevails in the Revenue district of Nellore and in the Sathiavedu range of the Chingleput District. The forests are divided into convenient grazing blocks called kanchas. These are of two classes—local and foreign. Local kanchas are those required to meet the grazing needs of the villages in the immediate vicinity. Foreign kanchas are those which are not required for the needs of the adjoining villages. These are sold after providing fully for the needs of the local villagers. They include kanchas which have been treated as such and also unsold local kanchas. Local kanchas are first offered on tender for local villagers at rates per acre based on average rates realised during the preceding three years subject to a minimum of four annas in Nellore and of two annas in Chingleput. After all the

local kanchas have been sold, the foreign kanchas and unsold local kanchas are sold in auction to the highest bidder. The lease runs from 1st May to 30th April and is granted for one or more years at the option of purchasers. The lease is granted either to a single person or to a number of persons collectively. The kancha area is closed to grazing for five months from 1st May to 30th September to enable the grass to grow to a mature crop and to seed for successive crops. To several of the kanchas are attached adjoining hill portions and also felled coupes which are closed to grazing for purposes of protection but from which the removal of cut grass is allowed. The Kanchadar is supplied with permit books to be issued at rates fixed by himself to the graziers. The number of cattle to be grazed are strictly limited to the area—two acres per cow in the kanchas of Nellore and four acres per cow in those of Chingleput. No penning is allowed in kancha areas except with the specific permission of the District Forest Officer. The kanchadars are held responsible for the efficient protection of the areas entrusted to them, to carry out the conditions of the lease and for the proper management of the kanchas. They are fined for the nonfulfilment of the conditions of the lease.

General :—The previous history of grazing in the Nellore District shows that the kancha system is a time-honoured one. To the question, when did the kancha system begin, echo answers when ? Centuries ago it was devised by the people themselves to help their cattle breeding operations and devoutly followed by them since then. It is well known that Nellore is famous for its fine breed of bulls and cows, and this is mainly due to the well regulated system of grazing adopted by the people. It is thus wrong to suppose that the kancha system was

ever *introduced* or forced on the people. What this department has been doing in the past was that whenever there were any defects in the manner of its working or strictures which caused hardship, it did its best to remove them and to facilitate its smooth working. Statements that the system was never popular are incorrect and misleading. The Forest Commissioner in 1906, in his special report (submitted after holding a conference and making local enquiries) stated that all the ryots rich and poor declared themselves in favour of the kancha system without even a single dissentient voice. The Forest Committees of 1912 highly commended this sytem and its benefits to the cattle owners and stated that it has worked well, except for occasional failures due to the bad faith of the kanchadars. Mr. Cox in his report of 1920 (written after a conference and local enquiry) stated that the kancha system was favoured by the better class of cattle-owners and the more enlightened villagers.

In the working of the kancha system four different interests are involved viz., the Government, the kanchadars, the owners of superior cattle and the owners of inferior cattle. The system is advantageous to Government in that it fetches a large amout of grazing revenue and has satisfactorily protected not only the grazing area but also the hill slopes and felled coupes attached to the kanchas. The kanchadars have no grievances against the system (except in respect of the five months closure which may be reduced to three months). It is still favoured by professional cattle breeders as well as individual villagers who breed cattle in a small way as an auxiliary to cultivation and the owners of superior cattle as it ensures ample and concentrated grazing for their valuable cattle, and they are willing to observe the

restrictions and pay the higher fees. It is only the owners of inferior cattle who are and have always been dissatisfied with the system.

As the cattle are useless ones their only anxiety is to get them off their hands for a whole year at a minimum fee, and to this end they prefer the permit system to the kancha system. They are not prepared to pay the higher fees charged for kancha grazing and do not care for the better grazing it provides, obviously for the reason that they themselves are conscious that their cattle are not worth them.

The permit system which is so eagerly hailed by the shortsighted villagers of Nellore has serious disadvantages of its own. The old block system of grazing by which the forests were divided into convenient blocks and were equitably allotted to the adjoining villagers according to their requirements, was fairly satisfactory as it secured to a large extent limitation of cattle to the possibility of the forests. But under the divisionwide permit system now in force neither any equitable distribution of grazing grounds nor any limitation of cattle to their possibility is at all possible. Further the Forests are not closed to grazing for a period in order to secure the maximum yield of grass. The result is that though the department gets its revenue the poor cattle get very little grazing. The advantages of the block system and of the limitation of cattle and of the necessity for renewing it and of closing the areas for grazing for a few months have been strongly urged in the first progress report in giving effect to the recommendations of the Agricultural Commission and referred to in the subsequent reports.

It would seem that the dissatisfied section of Nellore villagers who now clamour for the abolition of the kancha

system and the introduction of the permit system do so for the following reasons:—

(1) They do not care for the kancha system which is too good and too costly for their worthless cattle.

(2) They have either forgotten or under-rated the evils of the permit system.

(3) They have been encouraged by the example of the Kanigiri range, where the kancha system has been temporarily replaced by the permit system, owing to adverse local conditions.

(4) The present permit system suits their purpose well—it is cheap, it opens the forests of a whole range (now division) for their cattle, with no limitation and no closure to grazing.

(5) The villagers belong to the interior backward taluks, they are illiterate and are unable to appreciate the benefits of the kancha system.

As regards the question whether the permit system has worked well in other districts, it has to be admitted that the interests of the cattle have suffered considerably, that the areas—particularly portions near villages, have been over-grazed to the detriment of the forests, that in some districts, as in Guntur, even trees are pollarded to obtain leaf fodder to supplement the insufficient grazing available for the unlimited cattle driven into the forests. Thus the permit system in its present form does not work at all well in other districts in so far as the welfare of the cattle and the interests of the forests are considered and even if it did, it would not be suitable for the peculiar needs of the Nellore district.

The Kancha system is an ancient one and is sound in principle, the Forest Department has always been aking considerable trouble to rectify its defects, im-

prove it and popularise it solely in the interests of the welfare of the cattle. It is the duty of Government to try to mend the system before ending it. Government will be doing a permant harm to the district by abolishing the kancha system which has largely contributed to the breeding of fine cattle in this district, in order to pacify a minority section which has unduly exaggerated certain drawbacks, which could be easily rectified. The maintenance of a good breed of cattle is impossible under the permit system, while the kancha system is the best system suitable for it in Nellore. The Nellore breed of cattle is an asset to the district and a credit to the Presidency. The kancha system is thus undeniably advantageous to the owners of superior cattle and their interests cannot be sacrificed to the exaggerated complaints of the owners of worthless cattle who have nothing to lose by the abolition of the kancha system.

Abstract of results of germination tests on certain seeds carried out at the Madras Forest College.

Apparatus used : germination tray, with blotting paper dipping in water.

Serial No.	Name of seed.	Source and date of collection.	No. of seeds put in.	Date of starting.	Date of germination of first seed.	Date of closing.	% germination.	Remarks.
1	Acacia arabica.	Madras Forest College Estate.	50	16–6–32	—	7–7–32	0	*No pretreatment.* Failure perhaps due to closing the experiment too early (21st day).
2	Do.	Do.	50	7–9–32	15–9–32	2–10–32	60	Soaked previously for 30 min. in water at 80°c.
3	Adina cordifolia.	Mt. Stuart 7–3–32	50	13–8–32	—	14–9–32	0	Failure.
4	Albizzia odoratissima.	Satyamangalam. 18–3–32	50	20–7–32	1–8–32	11–8–32	34	
5	Anacardium occidentale.	Udipi. 19–4–32	10	30–9–32	23–10–32	4–11–32	60	Whole fruits were put in. (i .e. seeds were not separated.
6	Anogeissus latifolia.	Satyamangalam. 18–3–32	50	31–5–32	—	23–6–32	0	Failure.

7	Andropogen monticola.	Naini-Tal U. P.	50	8–6–32	12–6–32	23–6–32	2	
8	Bambusa arundinacea.	Palghat.	50	24–6–32	25–6–32	18–7–32	86	
9	Bombax malabaricum.	Coondapur.	50	22–7–32	22–7–32	13–8–32	22	
10	Chloroxylon swietenia.	Badrachalam. 25–8–32	50	27–8–32	—	20–9–32	0	Failure.
11	Dalbergia latifolia.	Pollachi. 21–4–32	50	13–8–32	16–8–32	31–8–32	92	
12	D. sissoo.	M.F.C. Estate.	50	23–2–33	25–2–33	15–3–33	80	
13	Delonix regia.	Do.	25	Do.	2–3–33	20–3–33	72	Treated as for No. 2.
14	Do.	Do.	25	Do.	7–3–33	31–3–33	8	(Untreated).
15	Lagerstroemia flos-reginae	Coondapur.	50	24–6–32	—	5–8–32	0	Failure.
16	L. lanceolata.	Tunaccadavu. 7–3–32	80	31–5–32	6–6–32	24–6–32	5	
17	Pterocarpus marsupium.	Bolampatti. 2–5–32	50	20–7–32	1–8–32	13–8–32	30	
18	Shorea robusta.	Ganjam. 25–5–32	50	2–6–32	3–6–32	24–6–32	16	
19	Do. sown on soil in a pot.	Do.	50	Do.	9–6–32	30–6–32	4	
20	Xylia xylocarpa.	Coondapur.	50	24–6–32	25–6–32	19–7–32	30	

Note :—

As will be seen from the small number of seeds dealt with, these experiments were on a very small scale, designed more for a study—by the students, of the various stages in the germination than for arriving at the normal percentages of germination. Except in items 2, and 13, there were neither a selection nor a pretreatment of any kind.—G. V.

College Notes.

1. The First Coimbatore Olympic Sports :

The First Coimbatore Olympic Sports, open to the Districts of Coimbatore, Nilgiris, Salem, Malabar and South Canara, conducted under the direction of the Coimbatore Athletic Association, which is affiliated to the Madras Olympic Association were held on Saturday the 11th February 1933, on the Stadium ground before a large gathering of spectators, the heats being held on the previous day.

On both days the weather was bright and clear but very hot. The most conspicuous item of the Sports was the "March Past" of all competitors and judges round the course to give the Olympic salute before the finals commenced. It was an impressive function and Mr. J. H. Elliott, the D. S. P., received the salute. The St. Joseph's Industrial School band was in attendance.

The aggregate championship shield was annexed by the Government College with 28 points to their credit, the Agricultural College being the runners up with 25 points. The Olympic gold medal presented by Rao Saheb Dr. T. A. Raja, which was, according to the rules, to be awarded to the competitor who secured at least a third place in a "throw", "run" and "jump" event and also secured the maximum number of points, was won by Mr. P. Bennet Masilamani, student of the Agricultural College.

The competition was keen, and the standard was fairly high.

The Madras Forest College had their own contingent of competitors. In the past two years, when this was conducted by the Y. M. C. A., and open to Coimbatore District only, the Forest College won the aggregate

championship shield, but this year they did not do well being placed 4th with 12 points. The College had entered for all the items but after the heats, was represented in the finals in nine items.

In these the College obtained the following places :–

1. Shot put	J. C. Sarwate	— 3rd place.
2. 120 yds. Hurdles	N. D. Kalbag	— 3rd „
3. Javaline throw	J. C. Sarwate	— 2nd „
4. 440 yards	C. S. Mannadiar	— 2nd „
	K. B. Ayyappa	— 3rd „
5. 2 miles Cycle race....	G. D. Saranjame	— 2nd „

The prizes and certificates were distributed, by Mrs. Elliott, to the respective winners. The function terminated with three cheers to the officers and judges.

N. D. KALBAG,

Athletic Captain.

2. Cross Country Race, 1933 :

The annual cross-country race was run this year on the 11th March, at 6–30 A.M. The morning was pleasantly cool. The course was ten furlongs less than that of the previous year, bnt was the same in other respects.

Nearly all students took part in the race. There was a keen competition. N.C. Madappa immediately took the lead followed by B. H. Patil and Chirukandan, till the fifth mile. Madappa then increased his lead leaving his two followers to compete for the second place, and easily won the race in 39 min, 6 secs, showing no signs of fatigue. B. H. Patil and Chirukandan were the second, and third home in 41 min. 3 secs., and 41 min. 31 secs., respectively. The remaining students, excepting two, completed the course within one hour.

All the first three students, juniors, in are to be congratulated on their achievement. It may be noted that the winner in the previous year was M. I. Khan a senior student.

3. Madras Forest College Students' Club Day.

The Annual day of the students' club of the Madras Forest College was celebrated on the 26th March, with much *eclat*. The proceedings commenced with musical item. After going through a variety-entertainment programme consisting of fancy dress competition, irrelevant speeches, flute, magic, Moghul Dharbar etc., a short and humorous drama in two acts "Vichu's wife" was staged. Then there was an interval during which the guests of the evening were treated to tea. After this, the Secretary of the club garlanded the President, and other distinguished guests of the day. The various prizes for the winners in the annual (Club Day) sports (held the previous day) and other competitions were then kindly distributed by Mrs. J.C. Wrench, who wound up the programme with a short and pithy speech thanking the students for the varied entertainment which was enjoyed immensely. With a vote of thanks from the secretary to the chair and the Prisident of the club, the function came to a close.

M. D'Souza.

4. Examiners for Final Examination, June 1933:

The following officers have been appointed to conduct the final examination in June 1933, in the subject noted against each:

Messrs. M. V. Laurie	....	Forest management.
J. M. Sweet	....	Silviculture.
E. S. Dawson	....	Survey and drawing.
G. C. Robinson	....	Range administration.
C. M. Belliappa	....	Botany.
M. S. Raghavan	....	Engineering.
H. P. Ward	....	Utilization.
A. L. Griffith	....	Physical Science.

* * *

EXTRACTS.

1. Sleepers for L. M. S.—(Railway company's new plant at Nottingham).

New plant for the output of railway sleepers has been installed at the L. M. S. Railway's creosote works at Beeston, in connection with a modernisation scheme. The plant is designed for more efficient and economical working, and for the output of 365,000 finished sleepers per annum.

The new plant includes two large creosoting cylinders, each holding 450 sleepers with a length of 79 ft., and an internal diameter of 6½ ft. The cylinders are fitted with high capacity steam ejectors for obtaining the necessary vacuum, while pressure is obtained from electrically driven pumps capable of attaining 200 lbs. per square inch. Recording apparatus indicates the temperature, pressure and volume of creosote forced into the wood during the process of creosoting.

Among other new machines installed are: An adzing and boring machine which saws sleepers to the standard length of 8½ ft., adzes the surface and bores holes for screws at a rate of 6 sleepers a minute; a "ferruling" machine which automatically presses the ferrules into the 'chairs' (for carrying the rails) at the rate of 15 chairs a minute; two screwing machines, (the first of this type to be introduced on the L. M. S.), each of which automatically screws the chairs to sleepers at the rate of five sleepers a minute.

The plant at these works consumes 1,000,000 gallons of creosote a year. From February to September, during which period intensive track relaying is in progress in various parts of the company's system, over 10,000 sleepers are despatched from the works each week, in addition to large quantities of other creosoted timber for various railway purposes.

—*The Timber Trades Journal*, 6–8–32.

2. Mycorrhiza on Conifer Roots:

A very thorough study of the root system of young conifers has been made by Dr. E. V. Laing for the Forestry Commission, and an account of this work is published by the Commission as Bulletin 13 under the title of "Studies on Tree Roots" (1932). This account contains an interesting contribution to our knowledge of mycorrhiza on these roots.

There are two forms of mycorrhiza; the ectotrophic, in which the fungus grows mainly on the surface of the root, and

the endotrophic, in which it penetrates the cells of the cortex practically as far inwards as the endodermis. Dr. Laing points out that whilst both forms may occur on the same tree yet, on the whole, the ectotrophic type is common in pine, spruce and larch, whilst the endotrophic type is characteristic of *Cupressus*, *Thuya* and *Taxus*. This distribution of the fungus correlates in an interesting manner with differences in cortical structure. In the first group of conifers the cortical cells have thin walls and contain little starch; in the second group characteristic girdle thickenings occur on the walls of the cortical cells and these cells usually contain starch; this is the type of cortex which is usually invaded by the fungus.

Dr. Laing's investigations also point to the significance of aeration conditions in the soil and manurial treatment in determining whether fungus and root system shall enter into the characteristic mycorrhizal relation. The conditions favouring mycorrhizal infection of the roots also favour vigorous growth of the young tree, so that it remains difficult to assess the significance of the fungus partner in the development of the tree.

It is stated that soil inoculation experiments have now provided convincing evidence of a direct relation between mycorrhiza formation and satisfactory seedling growth in the case of three species of pines, Scots pine, Corsican pine and maritime pine. From the practical side, the work of the committee has been devoted largely to an examination of the effect of the addition of humus to the nursery beds of tree seedlings, with a view of improving root development and mycorrhizal infection.

—*Nature*, 4–2–33.

3. The Present Status of the Sandalwood Spike Disease in Southern India :—

(*Extract from a lecture by Mr. M. Sreenivasayya, B.A., A. I. I. Sc., delivered at Coimbatore, on 8 - 10—1932*)

" The sandalwood spike disease has been noticed as early as 1899 by McCarthy and others. Right from the beginning, there have been at least two schools of scientists and others, who have advanced reasons for the incidence of this disease. One, the physiological school, quotes that it is due entirely to physiological factors affecting the plant, while the other school contends that the disease is due to an infection which is capable of being communicatad. A large amount of experimental work has been

done to elucidate information about what you may call the infectious theory. In 1917 Dr. Coleman of Mysore gave experimental support to the infectious theory by his grafting experiments wherein diseased scions were grafted to healthy stocks and communicated the disease. There were of course certain defects in Dr. Coleman's cxperiments; they do not take into account the percentage of success attained or the nature of controls run. The possibility of transmission from the soil was also not eliminated."

The lecturer then explained clearly with a number of slides how experiments were devised to test the physiological and infectious theory. "As regards the first, the disease could not be produced although the symptoms were created and the most significant factor was that the symptoms could not be communicated whenever they had been produced by alterations of physiological conditions. On the other hand, experiments designed to test the infectious theory by means of the leaf insertion method tended to show that the disease was communicable. This proved definitely that the sandalwood spike disease was due to some infectious principle. During the study of the disease every host plant of sandal was examined to find, if possible, any resistance could be attained to the disease by host association and in fact, hosts like *Acacia*, *Cajanus*, *Pongamia* were found to render the sandal plant susceptible to disease while plants like *Melia* and *Cassia*, impart relative resistance to the infection. The future of the work will depend for its success on selecting such resistance imparting plants as hosts and by pollarding suspected trees in order to reveal the masked disease and then eradicating all deceased trees to eliminote the sources of infection."

—*The Madras Agricultural Journal*, Nov. 1932.

4. Forestry in the State of Victoria in Australia:

A Forestry Department, under the name of the Forests Commission of Victoria, was established in 1907, which eleven years later was recognized and as far as possible made independent of political influences.

The Commission is mainly concerned with; (1) scientific methods applied to the forests of Victoria; (2) afforestation work on a sufficient scale to render unnecessary the further importation of conifer timber; (3) forestry research.

The total afforestcd area of Victoria is about 15 million acres but only a third can be utilised profitably. Eucalyptus varieties, of which there are no less than 200 suitable for differ-

ent soils and climates, form the most important element in the numerous species of trees to be found in the Victorian forests. Some of them, such as *Eucalyptus incrassata*, *E. dumosa*, *E. oleosa*, etc. are only to be found as dwarf forests in the dry plain lands of Millowa. Mountain Ash (*E. regnans*) on the other hand reaches a height of over 300 feet in the mountains to the east of Melbourne.

Unlike the majority of the other forest species in Australia, Redgum (*E. rostrata*) is generally found in pure stands only. The chief forests of this variety are situated in the neighbourhood of the Murray River, where the annual rainfall is too scanty, in view of the very high summer temperature, to maintain valuable forests in good condition, if the river did not overflow its banks annually, its flood waters being distributed over wide tracts of land by a system of naturally formed channels.

The best stands of Red Gum are to be found on the lower plains which are flooded regularly each year and are regarded as first quality trees. Second quality trees grow on the higher lands which are regularly flooded, except in particularly dry years, while the trees classed as third quality are to be found where inundation takes place only in years which are exceptionally humid. When a stand reaches the utilisation stage, i.e., when the trees have a diameter of about 27 inches at breast height, the first, second and third qualities will show approximate heights of 100, 90 and 65 feet respectively.

The Red Gum forests are very liable to fires, but this variety as a rule makes a good recovery; hence it usually happens that the forests are rather damaged than destroyed.

The Commission is particularly anxious to institute a good system of management for the Red Gum forests and therefore concentrates its attention mainly on the first quality trees. The mature trees are systematically exploited in all the stands and the young spinneys regularly thinned, the unsaleable refuse wood and litter being burnt and the trees that are over ripe for felling are destroyed by girdling.

Red Gum timber is too heavy for floating down stream and is therefore transported either by water in lighters during the flood months or by land, using animal traction. The wood gives excellent sawn timbers and sleepers and, being very heavy and tough and at the same time maintaining its condition well when embedded in the soil, it is very serviceable for bridge and platform building, etc. and also for telegraph poles.

Australia has no native pines and no species of European conifer is to be found among its indigenous trees. The must important Australian conifers belong to the *Araucaria*, *Callitris*, *Dacrydium*, *Agathis* and *Podocarpus* species. Of there *Callitris robusta* or Murray Pine alone makes stands of any considerable size. The Murray pine is one of the most valuable trees in the North-West part of the State, which is barren, dry and largely treeless with an exceptionally low annual rainfall.

During the last 10 years the region where the Murray Pine is to be found in large pure stands has been transformed into large scale wheat lands and it has been necessary for the State to retain the chief remaining stands in order to avoid the mischievous consequences of the disappearance of the forests, such as, e.g., shifting sands, etc.

C. robusta is rarely more than 70 feet high and grows either in mixed stands or in combination with *Casuarina lepidophloia*. It is a very slow growing tree and its timber is highly valued as it is almost white ant proof. Regeneration is a difficult matter because of damage by rabbits, which have been introduced by the settlers in huge numbers.

The Mountain Ash is another valuable species which flourisher best on mountain soils and forms timber resembling that of the normal ash. It is chiefly to be found in the districts to the east, north-east and south-east of Melbourne, where there is an annual rainfall of from 40 to 60 inches, at altitudes of 600 to 3000 ft. and has a rapid growth. At altitudes of 3000 to 4500 ft. the best stands of Red Mountain Ash (*E. gigantea*) are found. This is a large tree with timber resembling that of the Mountain Ash.

The average dominant trees in the stands of Mountain Ash are nearly 225 feet high and specimens have been found up to a height of 325 feet. The ordinary felling diameter is 8 feet which in very mature specimens may rise to 15 feet.

The working of the timber of the Forest Reserves is generally undertaken by private societies which lease the forest areas for a limited period. Since it is not possible to float Red Gum and Mountain Ash timber, it is necessary to utilize rail transport. The principal valleys are already provided with permanent railways, from which temporary tracks are carried to the felling areas.

In 1925–26 nearly 500,000 acres of State forest lands in Victoria were damaged by fire but five years later a large part

of the burnt over area was already occupied by young spinneys, 30 feet high.

Mountain Ash timber is easily worked and valuable for building work and general purposes and is handled in greater quantities than any other forest species in Victoria. On an average a well managed Mountain Ash forest yields about 50,000 superficial feet of timber per acre.

Experiments have been carried out, mainly in the neighbourhoud of the Kermandie River in Tasmania, with the object of ascertaining the value of Australian woods for paper making. The problem would appear to have been already solved as regards a number of species, including the Mountain Ash.

(Based on article by T. DAHLSTROM in *Skogen*, Stockholm, Nos. 3 and 18). R. W.

—*International Review of Agriculture*, Jan 1933.

5. A New Source of Rubber:

In order to avoid the necessity of importing rubber from tropical countries, the Soviet Government has organised investigations of native plants likely to contain this valuable product in their latex. Amongst various plants studied, several species of *Chondrilla* (Compositae) occurring mainly in the southern sandy regions, proved to be very promising and their cultivation is being carried out on an extensive scale. Green parts of the plant are cut and rubber prepared from the latex. The quantities obtained must be rather small, since only up to 2 per cent of the green mass represents rubber. Recently, however, it was found that certain insects feeding on roots of *Chondrilla* can be utilised for extracting rubber from the latex. One of these is a caterpillar of a pyralid moth, *Bradyrrhoa gilveolella* Tr., which feeds on the roots and constructs round its body a tube formed of condensed latex and sand grains. Up to thirty and more such tubes can be found on the roots of a single plant, and the tubes contain 9–17 per cent of rubber. Another useful insect is the larva of a buprestid beetle, *Sphenoptera foveola* Gebl., which also feeds on roots of *Chondrilla* and causes a large outflow of latex solidifying round the root. These swellings contain up to 4 per cent of rubber. Neither insect produces any serious effect on the infested plant, and healthy plants can be infested artificially in order to increase their productivity. Experiments are being made to test the practical and economlc side of this method of obtaining rubber.

—*Nature* 7-1-33.

6. Laterites and Lateritic Soils :

[The publication of "Soil conditions and Plant growth" 1932 Edition, by E. John Russell, synchronised with the visit of the Madras Forest College to Nilambur, where laterite & lateritic soils are characteristic. The following abstract from the book, on this type of soil will, therefore, be of interest :—]

The name laterite is borrowed from the geologists : it is rather an unfortunate choice, as it had a geological significance which does not necessarily agree with the soil definition. The name was first used (by Buchanan) to denote a surface deposit in Southern India, which is soft when dug, but hardens slowly on exposure, so that it forms a useful building stone...... ...... Examinations showed that it contains much iron oxide and alumina. Geologists regard ferric oxide as a characteristic constituent, while soil investigators regard alumina as characteristic, and emphasise the special mode of formation.

Formation of laterite soils ; climate :

The climatic conditions necessary for the formation of laterite soils are abundant rainfall and high temperature. True lateritic weathering occurs only on basic and intermediate rocks, not on granite : this usually weathers to Kaolinitic products. The igneous minerals intercalated in calcareous rocks, and introduced in volcanic ash showers during the deposition of the rock, may also undergo lateritic weathering and so in regions of intense leaching give rise to superficial lateritic deposits.

The true laterites : The course of the weathering is not yet known in detail. The older view that the rock first weathers to kaolin and that the soil water, supposed to be alkaline, dissolved the silica, leaving behind the insoluble iron and aluminium oxides, is now abandoned.

The final result, however, is as follows :— Under conditions of free drainage, continuous high rainfall and high temperature, the surface layers of soda and lime felspars decompose, forming some gibbsite and secondary quartz. Ferro-magnesium minerals give rise to hydrous iron oxides, the alkalis, alkaline earths, and magnesia being rapidly leached out, leaving a crust of highly hydrated, and highly ferrugineous gibbsite, together with secondary quartz. The iron and alumina components are slowly separated and the soil takes on a slaggy appearance : its

stucture becomes vesicular or vermicular through loss of minerals from the rock during decomposition.

The altered laterites : Red earths, or Lateritic soils :—

A further change takes place in lower lying situations under conditions of poor drainage with alternations of wet and dry periods. In the dry periods the ground water containing alkalis and silicates moves upwards, causing the primary laterite to become resilicated. There results, therefore, a layer of red earth, which may be as much as 50 feet thick. The primary laterite disappears or it can be detected only as a thin layer on top of the parent rock. These soils should, therefore, not be called laterite soils but " red-earth " or lateritic soils.

Leached or Podsolised Latertitic Soils.

A still further change may take place ; this red earth may be considerably leached by the heavy rainfall, losing iron & aluminium oxides, and leaving a quartzose grey top soil under a rich vegetation cover merging downwards into almost uniform red-earth.

We can distinguish, therefore, (1) Laterite soils. the result of the primary change, the characteristic of which is the presence of free alumina. (2) Lateritic red soils, the result of subsequent and secondary changes, characterised by the absence of free alumina in any quantity.

The *laterite* soils are usually thin, very porous, and non-plastic ; therefore less liable to erosion than soils of higher $Sio_2 / Al_2 o_3$ ratio. They lack cohesion and their water relationships are rather special. They lack potash & lime, being notably deficient in 'available' potash and phosphate. They are acid, and contain much combined water. They respond, however, to good treatment & manuring, and are easy to cultivate.

The *red-soils* are deeper & may be more fertile : their characteristic constituent is iron-oxide, to which they owe their colour and some of their properties. They resemble the true laterites in that one of their most striking physical properties is marked porosity. Water drains through them so quickly that they may be ploughed within a few hours of heavy rain.

In practice the distinction betwen laterites & red soils is not always drawn nor is it always practicable.

—"*Soil conditions & plant growth,*" *by E. John Russell 1932 edition.*

7. Canadian Forestry.

National Inventory of Resources.

The High Commissioner for Canada in London has received from the Department of the Interior at Ottawa the report of the Director of Forestry, 1931-32, the first to be issued since the transfer of the natural resources of the Prairie Provinces to the Provincial Governments of Manitoba, Saskatchewan and Alberta.

The report shows *inter alia* that the national inventory of forest resources, begun in 1929, in co-operation between the Dominion and various provincial forestry services, has been continued, and preliminary figures are presented relative to the forests of Manitoba. This province has an area of 251,832 square miles, of which productive forest covers 30,496 square miles and non-productive forest 62,513 s-uare miles. Of the productive forest land, 23,476 square miles are accessible to existing means of transportation.

A revised estimate is also presented as to the forest area of Canada, the figure given being 1,153,000 square miles, representing 312 per cent. of the total land area. This area is covered by 792,000 square miles of accessible and productive forest, of which 379,000 square miles carry timber of merchantable size. The total stand is now estimated at 267 733 million cubic feet, of which 165,846 million cubic fect is classed as accessible and includes 290,000 million board feet of sawn material and 920 million cords suitable for pulpwood, etc.

During the years 1926-30 approximately 3,900 million cubic feet of timber have been cut for use or destroyed by fire, insects or decay, fire accounting for 230 million cubic feet, and insects, etc, for 7C0 million cubic feet.

Nearly half of Canada's exports to the United States during the five-year period 1926-30 consisted of forest products. The average annual value was $ 231,631,180, or 49.2 per cent, of the total exports. The imports of forest products from the United States, on the other hand, amounted to only $ 32,642,146. The difference, $ 198,989,034, was the chief factor in reducing the unfavourable trade balance.

The pulp and paper industry is the most important manufacturing industry in Canada. During the five-year period 1926-30 the average contribution made by this industry to the wealth of the Dominion amounted to $ 221,000,000.

Investigation made by the Forest Service, Department of the Interior, shows that, although owing to the ravages of fire and disease and to destructive exploitation the supply of virgin timber throughout the Dominion has been seriously reduced, the forested areas, if propely protected from fire and disease and managed by proper forestry methods, are capable of yielding in perpetuity considerably more than the present annual consumption of timber. *—The Timber Trades Journal.*

8. Government review on the Forest Administration Report of the Madras Presidency for the year 1931–32 .—

The report is an interesting record of steady progress on the lines laid down by Government in 1931, when it was decided to abandon large-scale mechanical exploitation, and concentrate on conservation, protection and a limited kind of exploitation. This policy does not lend itself to spectacular results; and the administration must be judged mainly by the degree to which it has steadily discharged the routine duties of conserving the forest property of the State and making its produce readily available for public use; and, further, by the attention it has paid to scientific research into the problems of regeneration and protection against injury by disease.

The area of reserved forest is unfortunately far too small to supply more than a small proportion of the public need for fuel, grazing, etc. Only 10 per cent of the cattle of the Presidency obtained grazing in the forests including those handed over to panchayat managements; but while the number grazed in panchayat forests showed only a very small decrease as compared with last year, the cattle grazed in forests under departmental management fell from 1,531,661 to 1,409,175—a drop of 8 per cent. The Chief Conservator is investigating the cause of the difference between the two cases; but it may be surmised that while panchayat forests, having little tree-growth of any value, are notoriously apt to be over-grazed, the grazing in the forests under departmental management may have required special temporary restrictions in the interests of conservancy. The transfer of the issue of permits from commission agents to departmental agency (effected towards the close of the year in order to reduce expenditure) is mentioned by the Chief Conservator as a possible cause of the reduction in the number of permits issued.

Decrease occurred also in the amount of fuel, bamboos, and minor produce removed, whether departmenially or by private purchasers and others. In each case the decrease is

attributable partly to the reduction in demand resulting from contraction in general purchasing power. But in the case of some minor produce, the competition of imported produce. e.g., African wattle competing with avaram bark, is noticed.

If the general economic conditions restricted the consumption of such necessities as fuel, grazing, etc., it is natural to expect no less a curtailment in the consumption of purely commercial products. In fact, the disposal of timber (except sandalwood, which is in a class by itself and in respect of which special efforts were made to dispose of accumulated stocks) fell far short of the immediately preceding years. The out put was only 63, 740 tons, which is 25 per cent less than in 1930–31 which again was 11. 7 per cent below the figure of 1929–30 .

The result of these restricted sales of produce is that revenue, in the year under report, exceeded expenditure only by the insignificant figure of Rs, 8,000 ; or, if the net results of the "commercial concerns" (of which the principal were the Mount Stuart and Nilambur forests) are included, by 2. 68 lakhs.

This is unpleasant, but inevitable. The prevailing economic difficulties affected forest revenues at every point ; demand fell off, prices declined ; and the only counter-measure available was a drastic reduction of expenditure which was effected to the extent of 3.17 lakhs, or nearly 8 per cent, by economies which will be of fuller effect in the current year.

In the circumstances it seems clear that the right policy during the period of depression is to augment the scientific knowledge of the department with a view to improving the value of the forest assets against the day when the market will again expand ; to make as much progress as possible with plans for the future working of the forests, through the agency of the Working Plans staff and the Forest Engineer ; to watch every movement of the market for forest products and be ready to supply the various demands that arise ; and to maintain a rigid control of expenditure.

From the report under review it is clear that these objects are steadily kept in view.

Since the close of the year to which the report relates the retirement has occurred of the Chief Conservator, Mr. R. D. Richmond, C. I. E. The Government wish to please on record their high appreciation of the manner in which Mr. Richmond has administered the Forest Department during the past more than five years.

9. Preservation of Fossil Bones :—

The safest and simplest method of hardening permanently and without diicoloration the tusk and osseous fragments of the great Mammalia (mammoth and rhinoceros) recently found in the west of Scotland is repeatedly to baste the pieces with a strong solution of gum Dammar. This should be done after the object has become rather dry but before any warping occurs.

The method of treatment will, however, depend upon the condition of the relics. The Scottish pieces which I have handled are now exhibited in Kelvingrove Museum, Glasgow, and were all found in a very wet and spongy condition, 15–25 ft. under grass-level and in the laminated gravels of the old raised terrace of the Kelvin River, some eight miles east of Glasgow, at about 170 ft. O. D.

Had the pieces been allowed to remain without treatment, disintegration would now have been complete; with an incalculable loss to science—LUDOVIC McL. MANN.—*Nature 11–3–33.*

10. Bast Sap :—

Prof H. H, Dixon has described experiments which, it is claimed, elucidate the path and mechanism of translocation in plants. It is now suggested that the sieve tubes can permit a mas flow of solution. Experiments are described which show that under external pressures of 3 atmospheres, a solution introduced in the phloem moved at a rate of 7–8 cm. per hour. An incision into the phloem, without penetrating the xylem, frequently causes, especially in angiosperms, an exudation of a minute amount of liquid (0.1–0.2 c. c. from a 1 mm. slit in 30 min.) which contains organic matter (up to 12 per cent sugar). This mechanism of phloem exudation, which is now attracting considerable attention, is supposed to reveal the composition of the moving fluid and also to demonstrate the reality of mass flow. The osmotic pressure of the exudate varied from 13 to 35 atmosphores. Experiments on *Fraxinus excelsior* show that the sap from a higher level is always more concentrated than from a lower. This difierence (maintained chiefly by the supply of carbohydrates at a high level and their removal at a lower) causes the flow along the sieve-tubes. It is suggested that the theory offers adequte explanation for other recent results on ringing experiments. —*Nature 11–3–33.*

11. Virus Diseases :—

The term 'virus', formerly used in a much wider sense, has recently been given a special and restricted application. Viruses

are distinguished from such long-recognised agents of infection as bacteria by their small dimensions, putting many of them beyond the limit of clear visibility by the highest powers of the microscope and allowing them to pass through filters fine enough to retain the smallest ordinary bacteria ; and by the fact that they cannot be cultivated on ordinary, non-living media. The work of Pasteur and Koch initiated an epoch of investigation on the relation of visible becteria to different infections, so that the first clear recognition of the existence of ultramicroscopic and filterable infective agents came only in the last decade of the nineteenth century, and the present century has seen the rapid progress of investigations on their nature. The viruses first recognised—those of mosaic tobacco disease and foot-and-mouth disease—are still far beyond the range of the most advanced miscroscopical methods, and, if studied by themselves, might still be regarded as living contagious principles in solution. A large number of diseases of man, animals and plants are now known to be due to infection by viruses, and methods now available have shown that the infective units of the different recognised viruses cover a wide range of dimensions.

Ordinary bacterial filters only indicate that the sizes of the infective units of viruses are below a certain maximum. Ordinary miscroscopical methods may show that the particles of a particular virus are beyond the range of resolution, or that it contains particles which can be brought just into the range of visibility when loaded with a dye. Neither of these methods however, enables the natural sizes of the units of different viruses to be determined for comparision.

Conventional microscopical methods revealed the association between infection with certain viruses and the appearance in the infected cells of the relatively large structures termed 'inclusion bodies'. These could not represent the virus in the form in which it passes a bacteriological filter. In 1904, however, Borrel described extremely minute bodies in suitably stained films from the juice of tissues infected with fowl-pox, and similar ' elementary corpuscles ' were later found in material from vaccinia and from *Molluscum contagiosum*. The important discovery was made in recent years that the large 'inclusion bodies' consist of ' elementary corpuscles ' closely packed in a structureless matrix, and that a single washed inclusion body will transmit a virus infection. The evidence for identification of the elementary corpuscles as the organisms of of these viruses has been strengthened by their agglutination with sera from animals immune to the corresponding virus.

In the absence of any possibility of testing their identity with the virus by artificial culture, there remained that of comparing the sizes of fresh, unstained elementary corpuscles from different viruses, as measured on photographs of critical microscopic images, obtained with ultra-violet rays of a suitable wavelength with the sizes of the infective units of the corresponding viruses, as measured by differential filtration through graded collodian membranes, of which the effective pore dimensions could be determined with sufficient accuracy. The comparison of the measurements of visible corpuscles, on one hand, and infective units on the other, has now been completed in the case of several viruses, and has shown a correspondence so satisfactory as to leave no room for doubt that the elementary corpuscles are the organisms of these viruses.

Filtration measurements of the infective units of other viruses, however, show that they are much too small to be brought within the range of any microscopical method which can be foreseen. In the case of the virus of foot-and-mouth disease, the units appear to have a diameter as small as about 10 mu. only about twice that of the molecule of oxyhæmoglobin. The difficulty of regarding such minute particles as self-propagating organisms has given rise to the suggestion that they are toxic principles, reproduced by the perverted metabolism of cells which they infect. A similar suggestion has been made to account for the reproduction of the virus-like lysins or bacteriophages which infect bacteria. In both cases, however, such a theory seems to be incompatible with recent evidence dealing with specific immunity to such viruses.

Specific treatment of viruses is still limited to the production or re-inforcement of a naturally acquired immunity. Recent success in that direction with dog-distemper has aroused in some minds a hope of similar success with a human disease, such as influenza. The analogy fails, unfortunately, through lack of an animal species in which the influenza virus can be propagated and made the subject of deliberate experiment, and of evidence of a strong and lasting immunity to its attack. The facts, however, that methods for the exact study of viruses are only now becoming available, and that knowledge of their properties is of recent and rapid growth, justifies a general hope of much wider success in dealing with the diseases which they produce.

Nature—11–3–33.

12. Twisted Trees.

To one who has long been working on the problems prosented by twisting (spiral grain) in trees, the suggestion made

by Dr. Copisarow that the phenomenon may be traced back to to the mineral constituents of the cells, comes as a further possibility calling for examination in light of the facts so far as they have been recorded. Knorr's article in the *Journal of Heredity*, was apparently written without reference to the existing literature, even American literature, and leaves the reader with the impression that a new field was being examined for the first time, whereas it has attracted attention for at least a century.

Dr. Copisarow uses Knorr's data showing right-and left-handed twist to be approximately equally frequent as an argument in support of his suggestion, whereas the typical mode of occurrence is for either right-or left-handed twist to predominate strongly according to the species concerned. In certain species of pines in Europe and India, almost a hundred per cent of the trees over extensive areas may exhibit definite left-handed twist without a single example of right-handed twist. A change over in the individual from left-handed in youth to right-handed later in life is a fairly common phenomenon. The mode of occurrence of twist often suggests that the soil may be the cause, but, at least in *Pinus longifolia*, twist may be equally prevalent on limestone with a deep clay loam soil, as on lime stone with sandy loam or on coarse granitic gneiss. Knorr's observation is significant that of several species, all liable to twist, perhaps only one would be found to be twisted in a given area, and another in a second area.

Twist in trees certainly appears to originate during the secondary growth of the stems and there are indications that the so-called sliding growth of the tracheids in conifers may be intimately connected with the development of an increasingly inclined slant to the grain of the wood. Further knowledge on the growth of wood elements from the cambial initials is required to enable us to understand exactly what happens, knowledge to which Prof. Priestley's studies in Leeds are making important contributions.

Unless Dr. Copisarow can develop his suggestion so that it will account for twist predominantly in one direction or another irrespective of soil. and for a change over in direction with time, it does not take us much further than my own made in 1925, that such a detail as the prevalent direction of circulation of the cell contents (if they do circulate at all) might decide the initial direction, and sliding growth might accumulate small inclinations (if the tracheids do slide or anything like it).—H.G. CHAMPION.

—Nature— 28-1-33.

13. Virus Diseases and Intracellular Inclusions in Plants.

Virus diseases of both plants and animals are often characterised by the production ol abnormal inclusion bodies within the cells of the host. The bodies are usually of more or less spherical form and are protein in nature. Although they commonly accompany virus diseases, they have not been found to occur in hosts infected with any other type of disease, nor are they at all similar to the many intracellular inclusions formed in normal healthy plants.

These virus inclusion bodies have attracted much attention and various theories as to their origin and significance have been advanced. New light was recently thrown on the problem by a study of the response of the cells of several Solanaceous hosts to infection with aucuba mosaic of tomato. The first symptom of the virus attack to become apparent was an increased activity of the cell contents; the cytoplasm became more conspicuous and flowed more rapidly. Then minute particles of protein appeared in the cytoplasm which carried them passively about the cell. These particles aggregated and fused to form a few large masses; the latter ultimately coalescing to give a single mass which became compact and rounded. The mode of formation of these bodies lent support to the view that they are essentially products of reaction of the host cell to the virus. The question then arose as to whether similar effects could be induced in plant cells by physico-chemical means.

The species used in the study of aucuba mosaic disease included, among others, *Solanum nodiflorum*, *S. nigrum* and *S. lycopersicum*. Healthy plants of these three species were treated with small doses of chemical substances known to cause coagulation of protoplasm. The latter comprised mineral acids and salts and organic compounds such as acids, alcohols and alkaloids. Each of these reagents produced, in greater or lesser degree, symptoms similar to the first microscopic evidence of a virus attack: the cytoplasm became increasingly conspicuous and its streaming was accelerated. In some cases, hyaline spheres, similar to bodies which accompany certain virus diseases, were produced. These, however, always proved ephemeral; their movement about the cell might be followed for some hours but suddenly they would be lost into the general mass of plasm.

With one radicle it was possible to induce in the cell processes analogous to all stages of an attack of aucuba mosaic disease. Molybdenum, given in the form of molybdic acid, or its ammonium or sodium salts, produced these phenomena, but

it has not been possible to reproduce them with any chemically related substance. Soon after treatment began, the cytoplasm became more conspicuous and seemed to increase in volume. It streamed more rapidly, then minute yellowish particles appeared in it and were carried about the cell. When brought together by the flowing of the plasm, these particles coalesced. By aggregation and successive fusions a single large mass was gradually built up. The body, as finally formed, was rougher in outline and slightly more granular than those produced by infection with aucuba mosaic, to which it appeared to be essentially analogous.

As all produced similar preliminary effects, it is not obvious why the molybdate radicle should induce a much closer imitation of the microscopic effects of the virus than did any other chemical reagent used. If an adequate control could be exercised over conditions within the cell, it is possible that other coagulants might induce similar effects, but this introduces many technical difficulties which cannot at present be overcome.—*Nature–4-3-33.*

Prize " Howlers ".

Amusing mistakes from the schools.

The following are among the " howlers " published in the *University Correspondent* for January as having been received in response to an offer by that publication of a prize for the best collection of 12 amusing mistakes by school children.

(*The Times—1928*).

1. The Sun never sets on the British Empire because the British Empire is in the East and the sun sets in the West.
2. The Minister of war is the clergyman who preaches to the soldiers in the barracks.
3. A passive verb is when the subject is the sufferer as " I am loved ".
4. A Blizzard is the inside of a duck.
5. Alfred the Great strated a Chronicle and this still exists as a morning newspaper.
6. Shakespeare lived at Windsor with his merry wives.
7. Q. Translate. " They have come " if " they " refers to a girls' school: A. " Elles sont venuses.
8. *Lege utiles hominibus sunt.* Legs are useful to men.
9. ***Fulminantis** magna manus **Iovis**.* The thundering big hand of Jove.
10. *J'ai hatede l'embrasser.* I hate to embrace her.

Departmental Notifications.

1—3—33. The following promotions of Rangers are ordered :—

I. *With effect from 1-1-33 vice Ranger A. Joseph, Fifth grade deceased.*

1. Mr. A. Sitaramayya from the Sixth grade permanent to the Fifth grade (temporary). 2. Mr. T. S. Sankaranarayana Ayyar from the Sixth grade sub protem to the Sixth grade (temporary). 3. Mr. S. Nageswara Ayyar from the Seventh grade permanent to the Sixth grade sub protem from 1-1-1933 to 28-1-1933 and A. Tirupathi Rayadu from the Seventh grade permanent to the Sixth grade sub protem from 29-1-1933. 4. Mr. C. R. Ramamurti from the Seventh grade sub protem to the Seventh grade (temporary). 5. Mr. T. N. Vedantramanujam, temporary Ranger, Seventh grade to the Seventh grade sub protem. 6. Mr. C. K. Unni, Forester, First grade, to Ranger, Seventh grade temporary.

II. *With effect from 8-1-1933, vice Ranger R. Jagannatham Nayadu Sixth grade invalided from service*

1. Mr. P. K. Subbanarayana Ayyar from the Seventh grade (temporary) to the Sixth grade (temporary). 2. Mr. A. Sitarama Sarma from the Seventh grade sub protem to the Seventh grade (temporary). 3. Mr. V. Veeraswami Nayudu temporary Ranger Seventh grade to Seventh grade sub protem. 4. A. Muhammad Akbar Sahib Forester First grade to temporary Ranger Seventh grade.

III. *With effect from 29-1-1933 vice Ranger, P. Maduraimuthu Pillai Second grade, retired from service.*

1. Mr. Thomas Thachil from the Third grade permanent to the Second grade (temporary). 2. Mr. T. M. Duraiswami Pillai, from the Fourth grade permanent to the Third grade (temporary), 3. Mr. T. Venkatasubbayya from the Fourth grade sub protem to the Fourth grade (temporary). 4. Mr. U. Virddachalam Pillai from the Fifth grade permanent to the Fourth grade sub protem. 5. Mr. C. S. Ganapathy from the Sixth grade permanent to the Fifth grade (temporary). 6. Mr. S. Nageswara Ayyar from the Seventh grade permanent and Sixth grade sub protem to the Sixth grade (temporary). 7. Mr. S. M. Ansur Ali Sahib temporary Ranger Seventh grade to the Seventh grade permanent (filled on temporary basis). 8. Mr. M. P. Halasyanatha Ayyar, Forester First grade to temporary Ranger, Seventh Grade.

23—3—33. *With effect from 5-11-32 to 31-12-32 vice Ranger C. R. Rajagopalan Sixth grade temporarily reduced to Seventh grade*

Mr. P. K. Subbanarayana Ayyar, from Seventh grade (temporary) to Sixth grade sub protem.

Waltair Circle.

1. Mr. A. Arogyaswami Pillai, to Palakonda range. 2. Mr. C. G. Krishna, to Gokavaram range, Lower Godavari.

31—1—33. Mr. Y. Vydyanathan, posted to Guntur District for special duty on stock mapping of the mangrove forests in Repalli.

8—2—33. The leave granted to Mr. N. Chakrapani Iyyengar, Ranger Sixth grade extended further on medical certificate by four months.

21—2—33. Mr. K. R. Krishna Iyer, Ranger Fourth grade granted further extension of leave for three months from 24–1–1933, in continuation of leave granted.

7—3—33. Mr. P. S. Varadakrishnamachari, Palnad range to be in additional charge of Vinukonda range, until further orders. 2. On relief by No. 1 Mr. T. S. Ratnavelu Mudaliar, to Upper Godavari for Pulusumamidi range.

19—3—33. Mr. K. R. Krishna Iyer, Ranger Fourth grade granted further extension of leave for four months from 23–4–1933 in continuation of the leave granted.

19—3—33. The leave for two months granted to Mr. M. Subbarao, Ranger Fifth grade extended by four months on medical certificate.

22—1—33. Mr. Ch. Ramamurthi, Ranger, Seventh grade, posted to the charge of Vinukonda range, Guntur district.

22—3—33. Mr. B. V. Nagaraja Iyer, Ranger Second grade granted leave on average pay ou medical certificate for two months from 17–11–1932.

1—4—33. Mr. A. Tirupathirayudu, posted to Polavaram range, Lower Godavari division vice Mr. N. Narasinga Rao Naidu, granted leave. Mr. M. Narasingarao Naidu, Polavaram Range, grauted leave on average pay for four months.

25—3—33. On return from leave, Mr. D. E. Lewin, Ranger Third grade, posted to Udayagiri range, Nellore dirtrict.

Bellary Circle.

13—1—33. Mr. B. Krishna Rao, Ranger Sixth grade, posted to special duty under the D. F. O Kurnool West.

2—2—33. Mr. S. Riazuddin, E. A. C. of Forests posted to Vontimitta range, Cuddapah North Division to take charge on 1st March 1933. 2. Mr. S. Ramachandra Ayyar, in charge of Vontimitta range, on relief by No. 1 transferred to Vempalle Range in the same Division. 3, Mr. Abdul Rahim Khan, Vempalle range on relief by No. 2 to be assistant Ranger in the same Range.

2-2—33. Mr. B. Krishna Rao, Kurnool West division granted extension of leave for 2 months.

22—3—33. Mr. B. T. Seetharama Ayyar, Ranger Fifth grade granted leave for 3 months and 17 days from 9-9-32 to 25-12-32 both days inclusive.

25—3—33. Mr. D. N. Subrahmanya Ayyar, Kurnool East Division on expiry of his leave (6-4-33) posted to Kanigiri Range, Kurnool South Division. 2. Mr. S. N. Anser Ali, Ranger Seventh grade on relief by No. 1 will work under the orders of the D. F. O., Kurnool South.

25—5—33. 1. Mr. K. Thiruvenkatachari posted to Sanipaya Range, Cuddapah South Division. 2. Mr. N. Rajagopala Chetty on relief by No. 1 transferred to Vonipenta Range, Cuddapah North Division. 3. Mr. S. Rangamannar Das on relief by No. 2 will revert to his permanent post of Forester and remain attached to Cuddapah North Division until further orders.

29—3—33. Mr. N. Rajagopala Chetty, (Cuddapah South Division) on relief of Sanipaya Range transferred to Dornal Range, Kurnool East Division. 2. Mr. Varadarajalu Reddy, on relief by No. 1 will revert to his permanent post of Forester First grade in Kurnool East Division.

3-4—33. Mr. D. N. Subrahmanya Ayyar, Ranger Sixth grade, on expiry of his leave on 6th April 1933, posted to Chelama range, Kurnool South division. 2. Mr. D. Nagaratnam Trained Forester and acting Ranger Seventh grade Chelama range on relief by No. 1 posted to special duty in the some division and will continue as acting Ranger Seventh grade.

Working Plans Circle.

14—1—33. Mr. P. Kannan, Ranger Sixth grade, transferred to this Circle, posted for work in the South Coimbatore Working Plan Division. He should report for duty at Coimbatore when he will receive orders as to his headquarters from the Working Plan Officer, South Coimbatore Division.

21—3—33. Mr. N. Ayyanna, Ranger Sixth grade sub protem, attached to North Coimbatore and Kollegal Working Plan division granted leave on average pay for three months from 1-4-1933 or date of relief.

Salem Circle.

1. Mr. C. Karunakara Menon, Ranger Fourth grade, on return from leave on 24-1-1933 posted to Mamundur range of the Chittoor division. 2. Mr. P. Shunmugasundaram Pillai on relief posted to special duty in the East Vellore division.

21—1—33. Mr. P. Shunmugsundaram Pillai, Trained Forester, First grade, on relief by Mr. C. Karunakara Menon, Ranger Fourth grade, posted to Alangayam range, vive Mr. P.K. Subbanarayana Ayyar, Ranger VII grade temporary, reported sick.

29—1—33. Mr. C. Karunakara Menon, Ranger Fourth grade, attached to Mamandur range posted to Alangayam range, vice Mr. P. K. Subbanarayana Ayyar, Ranger Seventh grade temporary, reported sick.

23—2—33. Mr. M. S. Krishnaswami Ayyar, Ranger Sixth grade, granted extension of leave for four months from 27–2–1933 in continuation of the leave granted.

24—2—33. Mr. M. S. Kalappa, Central Salem divisiom posted to Thammampatti range. South Salem division, vice Mr. T. K. Parthasarathi Ayyangar, reported sick.

9—3—33. 1. Mr. M. R. Doraiswami Ayyar, Ranger Fourth grade on return from leave on 17–3–1933 posted to Dharmapuri range North Salem division. 2. Mr. K. Thathachari, Ranger Thtrd grade on relief by No. 1 posted to Anchetti range North Salem division. 3. M. Pakiyanathan, Ranger First grade sub protem on relief by No. 2 transferred to West Vellore division and posted to Tirupattur sale depot.

Coimbatore Circle.

16—1—33. The posting of Mr. M. P. Philip to Ulandi Range is cancelled.

5—2—33. Mr. K. K. Appayya, Ranger Fifth grade, on the expiry of his leave posted as Assistant Range Officer, Satyamangalam range.

7—2—33. Mr. B. Coates, Pollachi range, granted leave on average pay for three months from 29–3–1933 or date of relief. 2. Mr. P. Ramaswamy Ayyar, posted to Pollachi range, South Coimbatore division in relief of No. 1.

93—3—33. 1. Mr. U. Virdachalam Pillai, Ranger Fourth grade Punchai range, granted L. A. P. for two months from date of relief by No. 2. 2. On the closure of Valparai sleeper operations from 1–4–1933 Mr. P. A. Venkataraman, Ranger Fourth grade posted to hold charge of the Punchai range in relief of No. 1.

Ootacamund Circle.

23—1—33. Mr. K. R. Krishnan Nair, Ranger Second grade, doing special duty in Nilambur division transferred to North Mangalore division for employment at the District Forest Officer's convenience.

29—1—33. Mr. K. P. Chathu Nair, Ranger Third grade on expiry of his leave on 2–2–1933, posted to duty in Wynaad division at District Forest Officer's disposal.

18—3—33. 1. K. Shankarnarayana Rao, Ranger Fourth grade Kasaragod range, South Mangalore division, granted leave for two months from 10th April 1933 or date of relief. 2. Mr. V. Veerasswami Naidu, acting Ranger Seventh grade, Nilambur division, posted to Kasargod range.

The Madras Sports Works,

VARIETY HALL ROAD,

COIMBATORE.

Madras Office :

SHARMAN & Co., Mount Road, Madras.

Suppliers of Games Materials to most of the Schools, Colleges and Clubs of this Prsidency.

Every Sportsman knows that in the quality of our goods, the reasonableness of our prices and the efficiency of our service we simply defy competition.

Readers of THE MADRAS FOREST COLLEGE MAGAZINE are requested to patronise the only firm of actual sporting goods manufactures capitalised and manned entirely by South Indians.

P. K. SITARAM, B. A.,

Manager.